

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Improvements in and relating to Double Joints

We, GELENKWELLENBAU, G.M.B.H., of Westendhof 7, Essen, Germany, a German Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a double Hooke's joint arrangement and more particularly to the means employed for centering the cooperating shaft ends in propeller shafts. It is known that the end of one of the shafts can be provided with a ball head which is retained in a cylindrical bush formed at the end of the cooperating shaft. It has also been proposed to provide a spherical socket which is slidably mounted in the cooperating shaft end and embraces more than half the spherical surface of the ball. It has also been proposed in this latter form of construction to provide spring means for axially yieldably loading the socket in the end of the shaft.

However, these known forms of construction have the drawback that when steel bushes are used the latter are liable to wear out in course of a relatively short time of service causing the propeller shaft to be noisy in operation. The hammering given by the centring ball to the thin walls of the bush then soon leads to total destruction of the bush.

A substantial improvement can be achieved by spring-loading the spherical socket. However, the further disadvantage will then arise that the springs are likely to fracture after short periods of service, a fact due to such springs having to sustain considerable loads.

To overcome these drawbacks there is now proposed according to the present invention a double Hooke's joint arrangement connecting two rotatable shafts and having centring means for permitting relative deflection between the two shafts comprising a ball head integral with the end of one of the shafts

and engaging a spherical socket arranged in a member slidably mounted in a bore in the end of the second shaft, which second shaft is rigidly mounted with respect to a horizontal plane passing through its axis, characterised by the centring means including a shear-stressed rubber spring fixed to the said member between the member and the wall of the bore.

This arrangement has the advantage of being extremely resistant to wear. Such centring devices are at the same time easy and cheap to manufacture.

In the practical embodiment of the invention the rear face of the spherical socket may for instance be provided with a cylindrical pin-like extension upon which the rubber spring may be mounted. The outer periphery of the rubber spring may conveniently be embraced by a metal tyre. The spring may be vulcanised on to the pin-like extension and thus in combination with the socket constitute a replaceable unit assembly. The annular rubber spring may alternatively be mounted on an internal bush adapted to be pushed on to the pin-like extension. Finally, the annular rubber spring may be subdivided by a sleeve-like metal insertion to produce a spring having a progressively rising spring rate.

Several illustrative embodiments of double joints according to the invention are shown in the accompanying drawings in which:—

Figs. 1a and 1b illustrate one embodiment showing the joint in two different angular positions, whereas

Figs. 2 and 3 are modifications of the proposed joint.

The end of a shaft 1 is provided in known manner with a ball head 2 which works in a spherical socket provided in a slidable member 3 made of plastic, thus permitting the angular deflection of shaft 1. This socket is located in a cylindrical bore 4 in the end 5 of a cooperating shaft 11, which is rigidly

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mounted with respect to a horizontal plane passing through its axis. Between the socket 3 and the end of the cooperating shaft 11 the invention provides a shear-stressed rubber spring 6. The outside periphery of the rubber spring is embraced by a metal tyre 7. The slidable member 3 provided with the socket has a rearward pin-like extension 8 which projects into the centre of rubber spring 6 which may be vulcanised on to the same. Fig. 1b shows the position when the two shafts are in linear alignment, whereas Fig. 1a shows the deformation experienced by the rubber spring when the joint is angularly deflected.

In the embodiment according to Fig. 2 the rubber spring 6 is mounted on a metal bush 9 which is pushed on to the rearward pin-like extension 8.

In Fig. 3 the rubber spring comprises two interposed concentric ring elements 6a and 6b with a metal intermediate ring 10 separating the two concentric elements. The built-up rubber spring 6 shown in this form of construction has a spring rate which rises more steeply than that of a one-piece annular spring. In all the described forms of construction the ball head 2 works in the slidable member 3.

#### WHAT WE CLAIM IS:—

1. A double Hooke's joint arrangement connecting two rotatable shafts and having centring means for permitting relative deflection between the two shafts comprising a ball

head integral with the end of one of the shafts and engaging a spherical socket arranged in a member slidably mounted in the bore in the end of the second shaft, which second shaft is rigidly mounted with respect to a horizontal plane passing through its axis, characterised by the centring means including a shear-stressed rubber spring fixed to the said member between the member and the wall of the bore.

2. A double Hooke's joint arrangement as claimed in Claim 1, characterised in that the said member is formed with a rearward pin-like extension upon which the rubber spring is mounted.

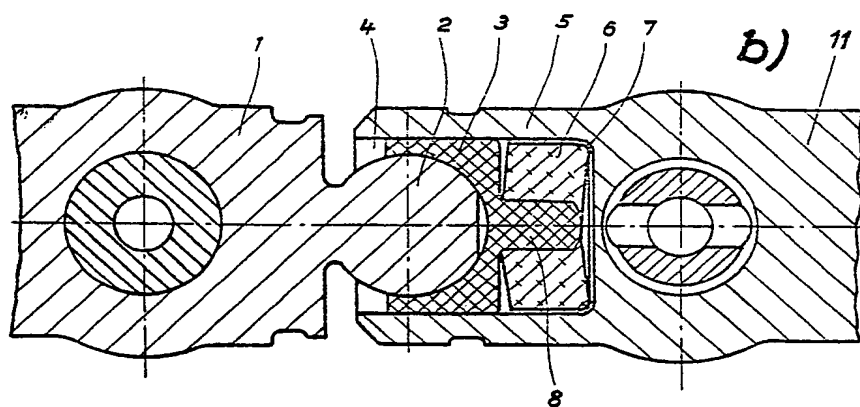
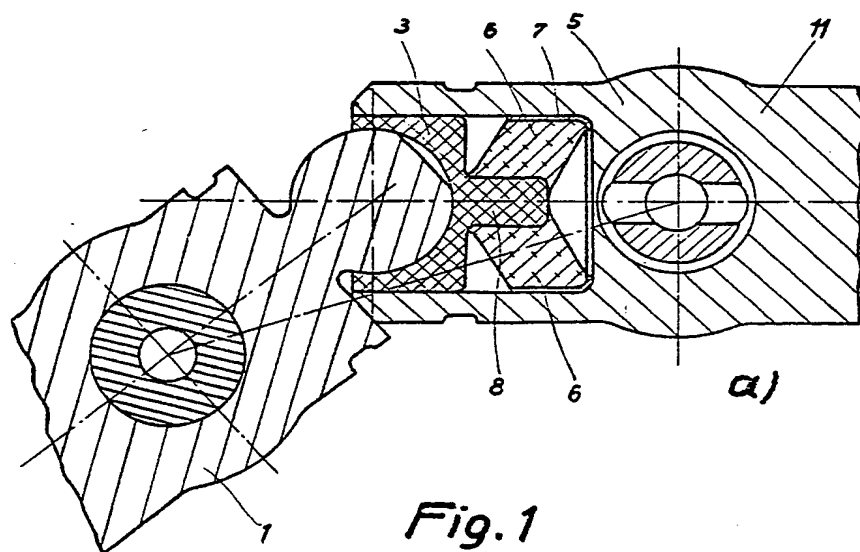
3. A double Hooke's joint arrangement as claimed in Claim 1 or 2, characterised in that the external periphery of the rubber spring is embraced by a metal tyre.

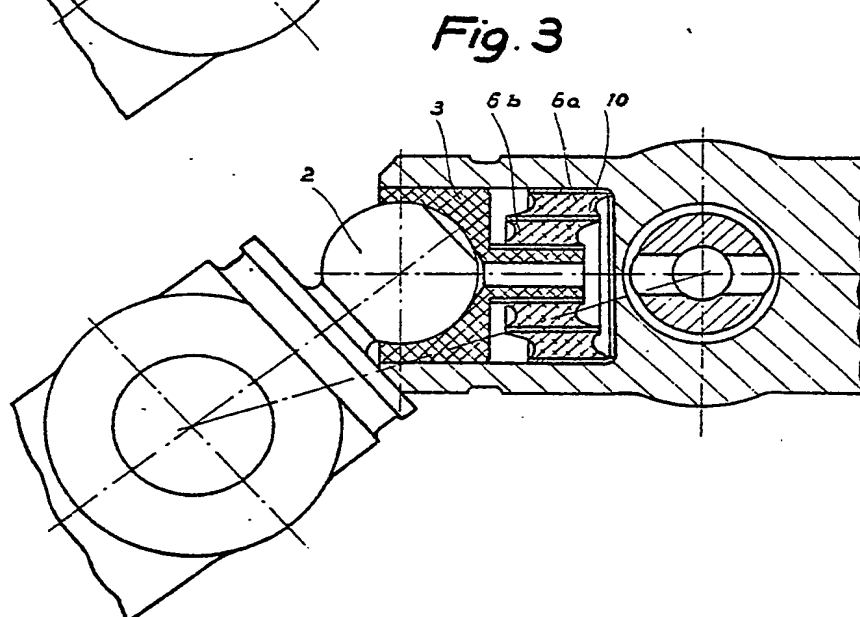
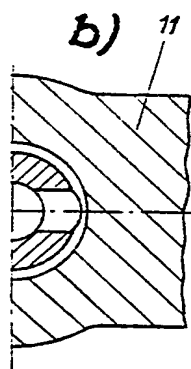
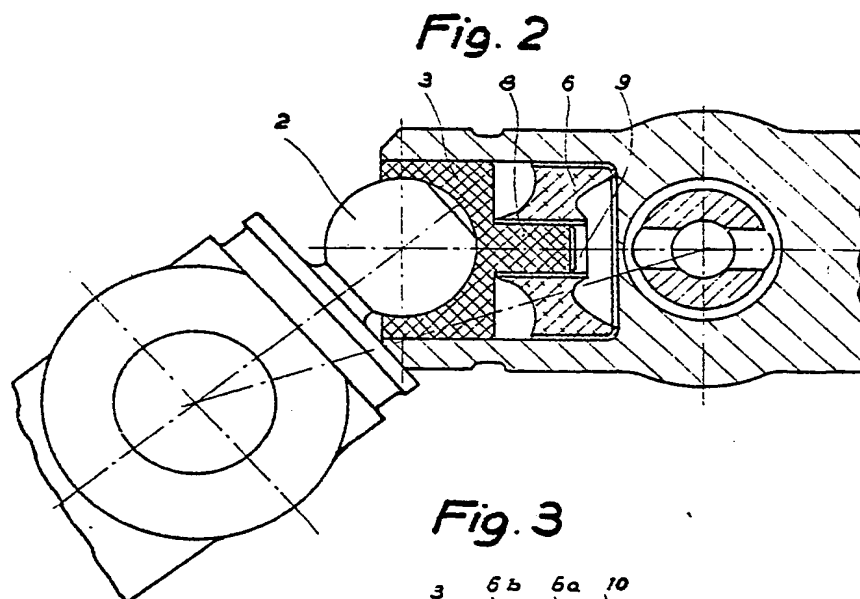
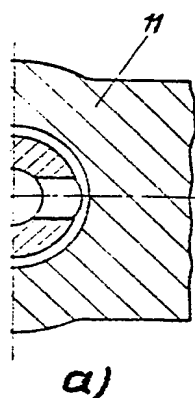
4. A double Hooke's joint arrangement as claimed in Claim 2 or 3, characterised in that the annular rubber spring is mounted on a bush adapted to be pushed on to the rearward pin-like extension of the said member.

5. A double Hooke's joint arrangement as claimed in any one of Claims 1 to 4, characterised in that the annular rubber spring comprises two ring-shaped elements with a metal sleeve sandwiched between them.

6. A double Hooke's joint arrangement substantially as herein described with reference to and as illustrated in Figure 1 or 2 or 3 of the accompanying drawings.

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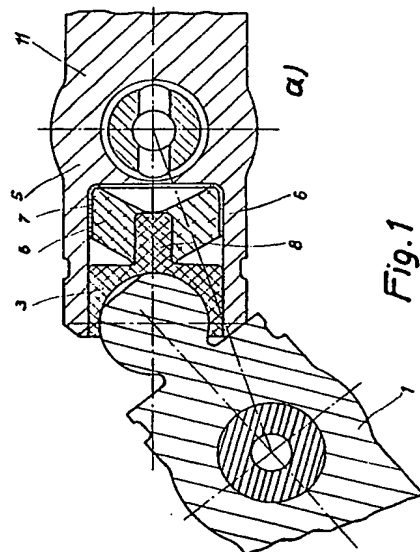
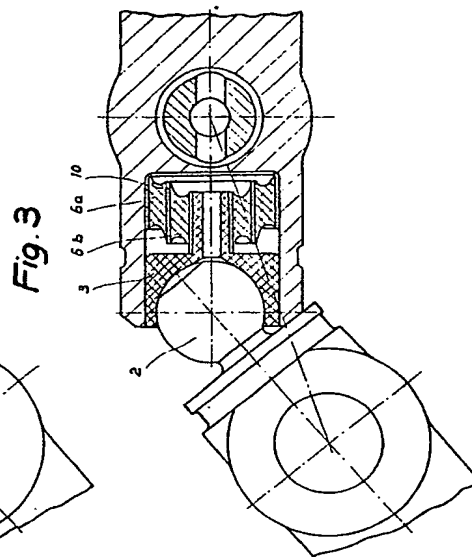
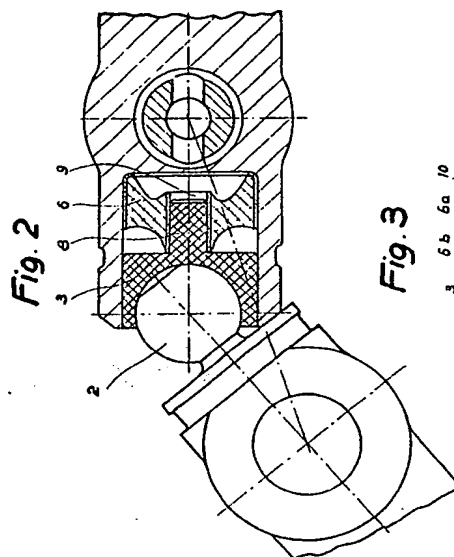
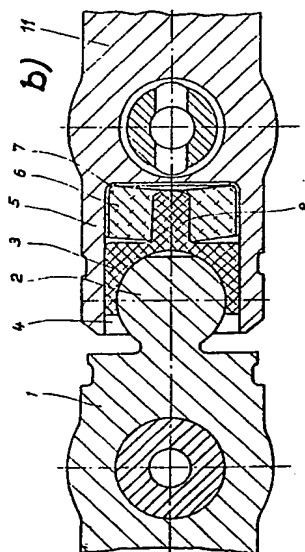


Fig. 1



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